REMARKS

Reconsideration of the present application is respectfully requested. Claims 2-8, and 12-15 are pending. Claims 3, 4, 12, 13, and 14 have been amended. Claims 3 and 4 have been amended to have proper antecedent basis. Claims 12, 13, and 14 have been amended to recite the function of the claimed polynucleotides. Claim 14 has been amended to recite hybridization conditions. Support for these claims is found in the claims as originally filed, and throughout the specification. No new matter has been added.

Applicant submits a substitute page 5 from the response of 2/14/02 as required by the Examiner. This page is the clean copy of the amended Abstract.

The marked up version of these amendments is found on a separate sheet attached to this amendment and titled **"Version with Markings to Show Changes Made."** It is respectfully requested that the amendments be entered.

Rejections under 35 U.S.C. §101:

Claims 2-8 and 12-15 are rejected under 35 U.S.C. §101 as not having either a credible asserted utility or a well-established utility.

The Examiner asserts that "...neither Applicants' specification nor the prior art teaches or provides guidance for how Rad50 activity can be assayed or tested."

Claims 12, 13, and 14 have been amended to recite "wherein the polynucleotide modulates the level of Rad50 polypeptide." Support for this amendment can be found on page 53, lines 1-5.

Contrary to the Examiner's assertion, assays for Rad50 are known in the art. For example, Raymond and Kleckner (*Nucl. Acids Res.* 21(16):3851-3856 1993; Ref. A2 in IDS submitted 6/23/00) describe several assays for Rad50 including gels and immunoblots (Fig. 1, page 3852), and ATP-dependent DNA binding assays (Figs. 2 and 3, page 3853), and immunoprecipitation (page 3853, col. 2, 1st paragraph). Further, various immunoassays are discussed in the specification (page 28, line 30 –

page 29, line 9), particularly a competitive ELISA, which is particularly useful for measuring protein levels.

Applicants have properly addressed by argument, amendment and evidence the grounds for the rejection. As amended, the claims require the utility of modulating the level of Rad50 polypeptide. Therefore, it is respectfully submitted that the rejection of claims 2-8 and 12-15 under 35 U.S.C. §101 should be withdrawn.

Rejections under 35 U.S.C. §112, first paragraph – Utility:

Claims 2-8 and 12-15 are rejected under 35 U.S.C. §112, first paragraph as the claimed invention lacks utility, therefore one of skill in the art would know how to use the invention.

As the Applicants have responded to the utility rejection under 35 U.S.C. §101, it is believed that the utility rejection has been overcome. As amended, the claims require the utility of modulating the level of Rad50 polypeptide. Therefore, it is respectfully requested that the concomitant rejection of claims 2-8 and 12-15 under 35 U.S.C. §112, first paragraph based on a lack of utility should be withdrawn.

Rejections under 35 U.S.C. §112, first paragraph – Written Description:

Claim 13 is rejected under 35 U.S.C. §112, first paragraph as containing subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventors, at the time the application was filed, had possession of the claimed invention.

Claim 13 has been amended to delete the phrase "loci within" to clarify the claim. Claim 13 has also been amended to recite "wherein the polynucleotide modulates the level of Rad50 polypeptide."

The Applicants maintain that the specification has ample description of amplification of nucleic acids from a *Zea mays* nucleic acid library to support possession of the claimed invention. On pages 24, line 15 – page 26, line 10 and pages 32, line 11 – page 36, line 19, the specification discusses various *Zea mays* lines that can be used to construct a nucleic acid library, the types of libraries that can be constructed, mRNA isolation, library construction methods, library subtraction and normalization methods, primer selection, amplification of subsequences, and 5' and 3'

RACE methods. Examples 1 and 2 on pages 59-62 give working examples of library construction and clone isolation for sequences of the present invention.

One of skill in the art is well versed in primer design for amplification. Textbooks commonly in use at the time the application was filed provide guidance on amplification and primer design, for example, *Diagnostic Molecular Microbiology: Principles and Applications*, DH Persing *et al.*, Ed., American Society for Microbiology, Washington, DC, 1993 (cited page 4, lines 16-18); Berger and Kimmel, *Guide to Molecular Cloning Techniques, Methods in Enzymology*, Vol. 152, Academic Press, Inc., San Diego, CA; Sambrook *et al.*, *Molecular Cloning – A Laboratory Manual*, 2nd edition, Vol. 1-3, 1989; and *Current Protocols in Molecular Biology*, FM Ausubel *et al.*, Eds. 1994 (cited page 10, lines 1-6)

The disclosure of SEQ ID NO: 1, including 5' and 3' untranslated regions, and the coding sequence provides guidance for primer design in order to isolate a full-length Rad50 from a *Zea mays* nucleic acid library. Example 4 (page 62-64), which points out conserved domains in the encoded polypeptide of SEQ ID NO:2, and the Multiple Sequence Alignment (Appendix A, response submitted 2/14/02) may be used as guidance in order to design primers directed to regions encoding conserved polypeptide sequences, if so desired.

Specific chemical and physical characteristics of polynucleotides encompassed by the present invention are disclosed in the sequence listing and are further discussed in the specification, including the ability to selectively hybridize (see, for example, page 13, line 3 – page 15, line 16; page 26, lines 12-32; and page 35, line 29 – page 36, line 19), RFLPs and differentiation of allelic variants (page 54, line 22 – page 56, line 7), having sequence homology (see, for example, page 16, line 20 – page 21, line 1;page 27, lines 1-11 and Example 3, page 62), and encoding a Rad50 polypeptide or reacting to an antibody raised to a Rad50 polypeptide (see, for example, page 5, line 20 – page 7, line 11; page 23, line 30 – page 24, line 12; page 25, line 29 – page 26 line 3; page 27, line 22 – page 29, line 9; and page 43, line 32 – page 44, line 25).

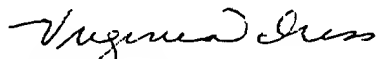
Several different physical and chemical characteristics of polynucleotides encompassed by the present invention are sufficiently described to reasonably convey to one of skill in the art that the Applicants are in possession of the invention

at the time of filing. Therefore, it is respectfully requested that the rejection of claim 13 under 35 U.S.C. § 112, first paragraph be withdrawn.

CONCLUSION

In light of the foregoing remarks and amendments, it is believed that claims 2-8 and 12-15 are in condition for allowance. Withdrawal of the outstanding rejections and allowance of all of the remaining claims is respectfully requested.

Respectfully submitted,



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Serial No. 09/538,396
Group Art Unit: 1638

VERSION WITH MARKINGS TO SHOW CHANGES MADE

The Applicants have used underlining to denote additions to the original text and square brackets [ ] to denote deletions of the original text.

The Abstract beginning at line 1 of page 67 has been amended as follows:

ABSTRACT OF THE DISCLOSURE

The invention provides isolated [maize] Rad50 nucleic acids and their encoded proteins. The present invention provides methods and compositions relating to altering Rad50 levels in plants. The invention further provides recombinant expression cassettes, host cells, transgenic plants, and antibody compositions.

In the Claims:

Claims 3, 4, 12, 13, and 14 have been amended as follows:

3. (Twice Amended) A host cell comprising [a] the [polynucleotide] nucleic acid of claim 12.

4. (Amended) A transgenic plant comprising a recombinant expression cassette comprising [a] the [polynucleotide] nucleic acid of claim 12.

12. (Amended) An isolated [polynucleotide encoding a polypeptide with Rad50 activity] nucleic acid comprising a polynucleotide selected from the group consisting of:
    (a) a polynucleotide having at least 80% sequence identity over the entire length of the reference sequence, as determined by the GAP program under default parameters, to a polynucleotide of SEQ ID NO: 1;
    (b) a polynucleotide encoding a polypeptide of SEQ ID NO: 2;
    (c) a polynucleotide of SEQ ID NO: 1;

(d) a polynucleotide which is fully complementary to a polynucleotide of (a), (b), or (c),

wherein the polynucleotide of (a), (b), (c), or (d) modulates the level of Rad50 polypeptide.

13. (Amended) [A] An isolated polynucleotide amplified from a *Zea mays* nucleic acid library using primers which selectively hybridize, under stringent hybridization conditions, to [loci within] a polynucleotide of SEQ ID NO: 1, wherein the polynucleotide [encodes a polypeptide with] modulates the level of Rad50 [activity] polypeptide.

14. (Amended) [A] An isolated polynucleotide which selectively hybridizes, under stringent hybridization conditions and a wash in 0.1X SSC at 60°C, to a polynucleotide of SEQ ID NO: 1, wherein stringent hybridization conditions comprise 50% formamide, 1M NaCl, and 1% SDS at 37C, or conditions equivalent thereto, and wherein the polynucleotide modulates the level of Rad50 polypeptide.